MIDDLESEX SAMPLING PLANT, PROCESS BUILDING HAER No. NJ-107-A
239 Mountain Avenue
Middlesex
Middlesex County
New Jersey

HAER
NJ
12-MIDSX,
1A-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
Northeast Region
Philadelphia Support Office
U.S. Custom House
200 Chestnut Street
Philadelphia, P.A. 19106

HISTORIC AMERICAN ENGINEERING RECORD

MIDDLESEX SAMPLING PLANT, PROCESS BUILDING

HAER NO. NJ-107-A

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12-MIDSX,
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Location: 239 Mountain Avenue
Middlesex, Middlesex County
New Jersey
UTM: Zone 0018, Easting 542994.49963, Northing 4491095.76065
Quad: Plainfield, New Jersey, 1:24,000

Date of Construction: 1910

Engineer/Architect: Unknown

Present Owner: U.S. Department of Energy
Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, TN 37831-8723

Present Use: Vacant

Significance: The process building was used between 1943-67 for sampling uranium, beryllium, and thorium ore for the Manhattan Engineer District/Atomic Energy Commission for use in the development of atomic weapons. This work was part of a top-secret nationwide fabricating effort during World War II to develop an atom bomb, and post-war, to create atomic weapons as part of President Harry S. Truman's Cold War policy of military supremacy over the Soviet Union.

Project Information Statement: The Formerly Utilized Sites Remedial Action Program (FUSRAP) of the U.S. Department of Energy (DOE) will demolish the process building and the boiler house as part of site remediation and decontamination. A Memorandum of Agreement between the DOE-Former Sites Restoration Division (FSRD) and the New Jersey SHPO stipulated HAER documentation to mitigate this adverse effect. This documentation was undertaken to fulfill this stipulation.

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Formerly Utilized Sites Remedial Action Program
Contract No. DE-AC05-91OR21950
Science Applications International Corporation (SAIC)
816 State Street, Suite 500
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NARRATIVE DESCRIPTION

The process building is a 5-bay by 16-bay two-story rectangular brick industrial building, measuring 60 feet wide by 260 feet long by 30 feet high. It sits on a raised foundation. The shallow-pitch gable roof is hidden behind parapet walls on the north and south sides, the latter topped with terra cotta tiles. A brick firewall extends from the roof above the load-bearing interior wall. A red brick tower rises from the roof at the fifth bay from the front (north). The structural system consists of brick piers, and retrofitted steel I-beams columns and piers on the interior. The roof consists of wood joists covered with 1" by 6" tongue-and-groove sheathing. The brick piers are two wythes thick and the bearing walls one- and one-half wythes thick. The brick has been sand-blasted as part of a remediation program. Large multi-paned fixed and transom industrial windows are recessed slightly between the brick piers. The front and side entrance doors are metal double doors with single 9" square windows in the upper sections. Similar single doors are located on the east, west, and south sides. On the east side is a panelled wood industrial overhead door with a row of glass panes, sheltered by a plywood marquee.

The front side is embellished to provide a more formal entry. The bricks are striated, unlike the smooth red brick surface on the rest of the building. Slight Classical detailing includes corbelling at the base of the first floor windows and the top of the second floor windows in an allusion to the base and capital of columns. The central bay is higher, enhancing the front entrance. Further detailing includes a row of soldier bricks at the top of the parapet, topped by a concrete coping, and concrete window lintels and sills.

The interiors of both floors are divided by load-bearing brick walls into two large rooms, with metal firedoors to shut off the wide opening between them. The front rooms are ten bays and the rear rooms are six bays. On the first floor, the larger room contains small vestibules, enclosed by original brick walls, that open off the front and side entrances. The east side of the larger room has been further partitioned with either concrete block or plywood to form offices, storage, and a carpentry shop; the center section is open. The carpentry shop holds such equipment as a table saw, pipe threader, planer, router, grinder, jigsaw, and bandsaw. It is not known when the machinery was placed in the process building. It is standard equipment and is not associated with the sampling machinery (all of which has been removed). The smaller first floor room has been partitioned with plywood to form storage areas. A metal frame staircase with concrete treads and pipe railings leads to the second floor.

On the second floor the larger room has been partitioned on both sides for offices, leaving a corridor down the center. The smaller room has been left open as one large space. The framework for dropped ceilings remains, although the acoustic tiles have been removed. The plywood floor is covered with 9" square green asphalt tiles that are peeling and loose.

A number of alterations have taken place over time to retrofit the building for different uses. In 1947, MED replaced the wood floor at the south end of the first floor with a concrete floor. Presumably at this time, the original wood structural members were removed and the present structural steel system and new roof were installed. A concrete loading dock replaced the wood dock on the east side. The outside storage area was paved for the storage of ore-filled drums. The large front entrance was reduced in size and a double metal door installed.

At some later date, possibly when the building was used by the Marines from 1969-1979, a number of doors and windows were infilled on the west, east, and south sides with brick, and metal fire escapes were added on the west and south sides. A new plywood floor with vinyl tiles replaced the old floor on the second floor. New drywall partitions were added to create offices on the second floor, with new hollow core doors and dropped ceilings with fluorescent lights added.

DESCRIPTION OF THE PROCESS USED TO SAMPLE ORE IN THE PROCESS BUILDING

(Unless otherwise cited, this narrative is taken entirely from the history of MSP written in 1958 by R.J. Cahalane of the National Lead Company of Ohio, the contractor responsible for the operation of MSP from 1950-55 for the AEC).

In October 1943 MED leased the warehouse property from the American Marietta Corporation as a place to sample and assay uranium ore for use in developing the atom bomb (for a more complete description of the Manhattan Project and the MSP role in it, see HAER No. NJ-107). MED contracted with the Perry Warehouse Corporation to provide labor, which included a plant foreman and a labor force to perform the sampling, crushing, and handling of the ore.

Because the MED bought only the uranium oxide content of the Belgian Congo ore from African Metals, representatives of both the U.S. Government and African Metals Corporation were required to observe the weighing and assaying at MSP. MED contracted with Lucius Pitkin, Inc. of New York City to provide two supervisors and two technicians to assay the ore. Pitkin was also responsible for the security of the laboratory in the process building, supervision of dust control operations, and examination of the machinery and equipment for damage and wear.

From 1943 to 1950 MSP sampled primarily Q-11, pitchblende ore (uranium oxide), that was shipped to the site from the Port of New York by the Lehigh Railroad, which had a spur line on the east side of the processing plant. Originally the ore came in heavy paper bags, later in steel drums. The drums were unloaded by forklift, separated into lots, checked by LeDoux and L. Pitkin, and either stored on site or taken into the building for sampling. According to Edward Poroskwi, a guard at MSP from 1946-1951, the rail cars were opened and left to air out for several days before workers were allowed to remove the drums (E. Porowski, personal communication, May 1996). If the ore was cold, the portion to be sampled was stored in the thaw house for 24 hours before being processed.

The sampling procedure entailed blending ores from different car lots, then weighing and assaying them to ascertain the average amount of uranium oxide present. The first manual sampling methods and equipment were crude. Initially the ores were sampled and blended by hand. The bags of ore were conveyed by a belt conveyor from the dumping station at Building 7 to the process building. Ore was conveyed to the second floor and emptied onto framed screens set on wood sawhorses. The ore was worked by hand through the screens onto the floor where it was shoveled and reshoveled to blend it. Another sampling method was cascading, where the ore was manually worked through a series of four-inch riffles extending from the second floor to the first floor. Because such methods exposed the workers to unacceptable levels of toxic dust as well as being time-consuming, a third method, pipe sampling, was tried, where ore was screened and ground mechanically, before pipe samples were taken. The mechanical method proved to be best for accuracy, health and safety, and economics. It decreased the amount of exposure of the workers to dust and took half as long.

Because none of the original machinery for processing ore remains, having been either transferred to the Fernald Feed Materials Plant in Fernald, Ohio or decontaminated and sold in 1955, the following discussion and diagram of the ore process cannot be located spatially within the building. Although the Cahalane report mentions work being done on the second floor, Edward Porowski, the guard interviewed for this report, indicated that the second floor was used for storage of non-ore materials, and that the processing took place both on the first floor and in the partial basement toward the center of the building. Possibly the second floor usage was in 1943-44 when hand sampling and riffling was done, before the mechanical process was established.

Porowski indicated that the dust collector was at the south door of the first floor (now bricked in), the processing machinery was located on the first floor at the rear (south), and the laboratory where the technicians assayed ore was located on the first floor at the front (north). A basement area about the size of a kitchen was located at the rear of the building, and machinery was set into it to reduce the noise from its operation (E. Porowski, personal communication, May 1996). The Q-11 equipment was enclosed in a room.

The Q-11 sampling process was as follows:

> The drum lids were cut off in preparation for dumping and in cold weather the drums were kept in the thaw house 24 hours before being dumped. The drums were dumped on the conveyor and the material carried to the rotary drier and after passing through the drier the material was conveyed to the jaw crusher, a 19 x 24 Telesmith crusher. A bucket elevator carried the ore to a 4 x 8 Tyler Niagara vibrating screen of 1/8" mesh. The oversized lumps were diverted to a secondary crusher, a Symons cone grinder, while the smaller particles passed through to the large surge hopper. The material leaving the Symons cone grinder was conveyed to the bucket elevator for recycle through the Tyler screen.
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> From the large surge hopper, the material was conveyed to the Vezin sampler by a Hardinge constant weight feeder. The sample cut of 20 percent of the material processed was caught in special drums that were designed to be mounted on a feed inlet to the bucket elevator and reprocessed through the Tyler screen, surge hopper, and Vezin sampler. Twenty percent of the original sample (or 4.0 percent of the total lot) was obtained to be processed and bottled for samples. The discard from the sample was collected in 30-gallon drums, sealed, weighed, and shipped with the lot.
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> The 4.0 percent sample of the lot was conveyed to the laboratory in covered hoppers or drums mounted on carts. This material was processed through a 10 percent Vezin sampler to obtain a 0.4 percent of the original lot. The sample obtained was spread in pans for a drying period of 48 hours at 118° C prior to determining the moisture content.
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> After the moisture determination, the sample was crushed, riffled, and pulverized to 150 mesh and screened. The final sample was then blended and re-dried, and nine sealed samples were bottled for storage and distribution (Cahalane 1958:13).

The samples were then assayed by Pitkin on site, or sent to LeDoux in New York City, or the Mallinckrodt Chemical Works in St. Louis. After 1948 samples were sent to the New Brunswick

Laboratory, New Jersey, for assaying. A standard sample was prepared by the National Bureau of Standards in Washington, D.C. and sent to these laboratories to provide a standard against which the laboratories could check the results of their sampling methods.

In 1950 MSP began to receive, process, and sample MgX, magnesium di-uranante precipitate, as well as uranium ore. At this time little was known about the handling of this material; it was very fine, created a dust problem, gave off alpha radiation waves, and was hygroscopic. New machinery was necessary to sample it, so a system was developed using items available on-site as well as items obtainable in the area. The process for sampling MgX was as follows:

> The chemical precipitate called MgX was received in drums. When packed it had the tendency to form balls or clots, which had to be broken prior to sampling. The drum lids were cut off and the drums dumped by the drum dumper at the bucket elevator feed station. The bucket elevator conveyed the material to the lump breaker from which it dropped into a surge hopper. A feed screw conveyed the material to a Vezin sampler unit where a 10 percent cut was taken for a sample. This 10 percent sample was directed to a second Vezin sampler which took a 10 percent cut to make a final sample of 1 percent of the total lot.
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> This final sample was taken to the laboratory where it was mixed, coned, and quartered successively. Two quarters were placed in the oven for drying and after drying it was riffled, ground and screened through an 80 mesh screen. This sample was bottled for distribution (Cahalane 1958:23).

Dust hoods were placed at either end of the process, at the feed hopper and over the drums. Ultimately the MgX packaging station was enclosed to control the dust.

Beryl ore (INX) from India or South America was also sampled at MSP. The ore arrived by truck or rail in 100-pound burlap bags. The same equipment that was used to sample Q-11 material was used to handle beryl ore; the system was thoroughly cleaned before changing from one material to another. Thawing and drying of beryl ore was not necessary. The ore was crushed in the jaw crusher, passed through a 5/8" screen, and then packaged in 55-gallon drums for weighing and shipment to the Brush Beryllium Company in Luckey, Ohio. The sample, consisting of 8 pounds of ore ground to 20 mesh, was poured into four bottles; one going to the New Brunswick Laboratory for assaying and the other three being stored.

Over the years of operation, various improvements were made to the equipment. New sampling equipment was added in 1947: a ball mill, Vezin sampler, and blender. The new equipment could not process frozen ore, so the thaw house was built. Originally the heads of the steel drums, welded on, had to be cut open with an acetylene torch, exposing the workers to dust and radiation. A mechanical drum deheader was installed. The construction of a long L-shaped wood ramp at the south end of the building, the installation of roller conveyers, and the purchase of a forklift helped in handling materials. Manual emptying of the dust collectors into unvented drums was replaced with a dust-tight mechanical conveyor that returned the dust to the Q-11 bucket elevator.

Security around the stored drums and the process building was of great concern at MSP. There were 12 guards assigned to the operation. According to Porowski, guards patrolled the perimeter of the property, turning keys in clocks at set patrol points to indicate the time they checked the route. Additionally, a guard tower was located on the southwest corner of the process building, occupied by a guard from 4:00 P.M. to 8:00 A.M. There were numerous floodlights. A two-way phone system was installed in the guard tower, and connections were established with the American District Telegraph so night duty guards could call them if necessary. According to Porowski, the top secret operations at the site were made to look as much as possible like the operations at the previous paint factory, and he dressed like a regular worker rather than having a guard's uniform. Workers at the plant took an oath not to reveal anything about the nature of their work or even where they worked. Mr. Porowski, for example, was not allowed to let his wife know his working whereabouts. During off hours one of his duties was to visit the local tavern to make sure none of the workers talked about his job at MSP (Cahalane 1958: 36; E. Porowski, personal communication, May 1996).

After 1955, the sampling operations at MSP were transferred to the Fernald Feed Materials Plant in Fernald, Ohio, and the process building was used for limited sampling of thorium residue. From 1969 to 1979 the process building was used for offices, storage, and recreation by the U.S. Marine Corps, Sixth Motor Transport Battalion reserve training center. A basketball court was located in the large room on the second floor. Presently the rear of the first floor is used for storage, and the remainder of the building is vacant.

Sources of Information:

Interviews

Edward Porowski, telephone interviews May 1996, Santa Barbara, California to Piscataway, New Jersey. Former guard at MSP from 1946-1951.

Gerry Blust, April 1996, Middlesex, New Jersey. Bechtel, Site Manager MSP.

Bibliography

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Ford, Bacon & Davis Utah Inc. *Engineering Evaluation of the Former Middlesex Sampling Plant and Associated Properties, Middlesex, New Jersey*. Salt Lake City, Utah: Ford, Bacon & Davis Utah, Inc., 1979. DOE/FBDU 230-001.

Maps

1927 corrected to 1948. "Bound Brook, New Jersey, including South Bound Brook, Somerset County, and Middlesex, Middlesex County, New Jersey." The Sanborn Map Company, New York, New York.

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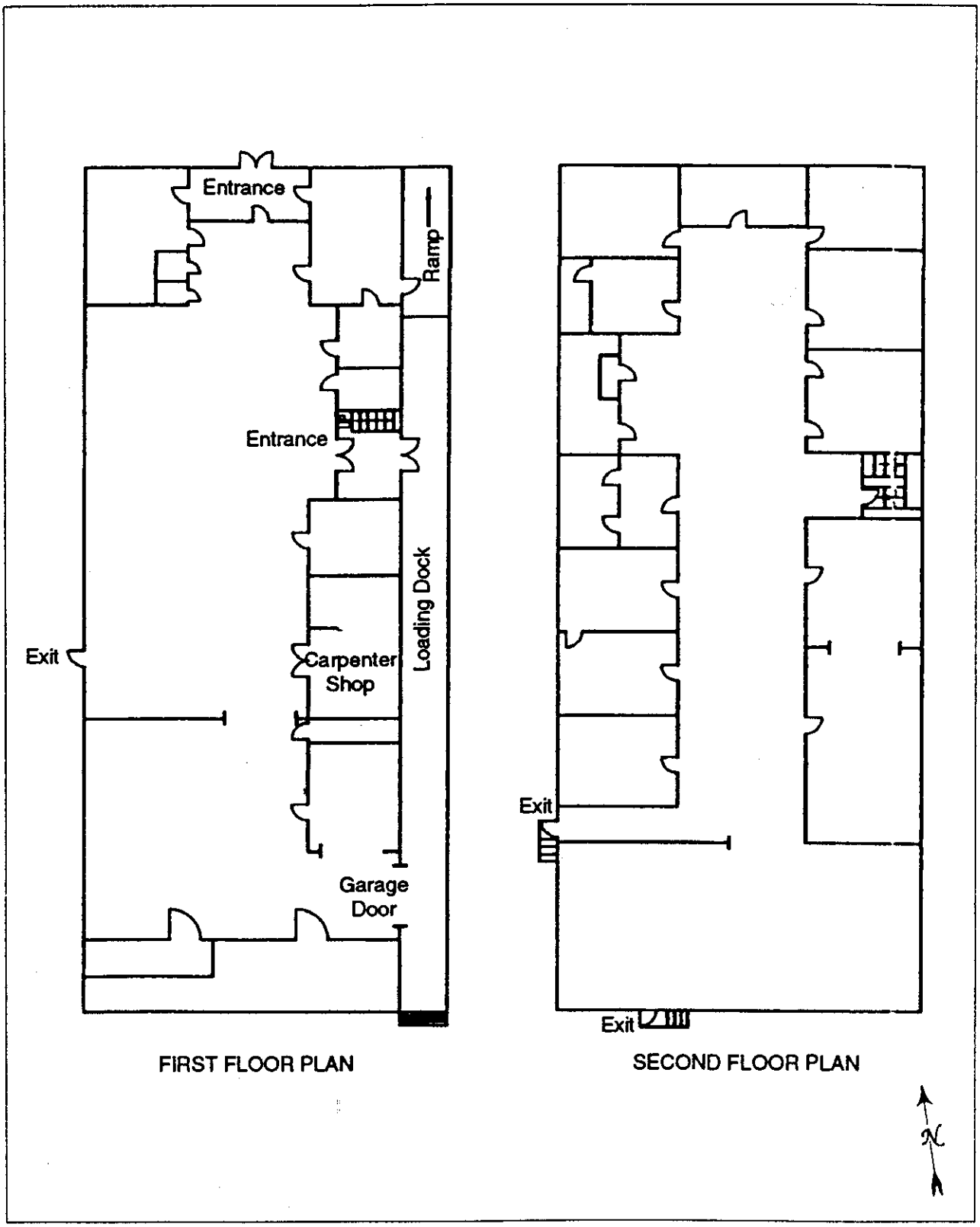

LAYOUT OF PROCESS BUILDING. 1996